REMARKS

Reconsideration and allowance of the subject application are respectfully requested. The Examiner has noted a number of informalities in the specification and in claim 9. Those informalities have been remedied by amendment. Withdrawal of the objections is respectfully requested.

Claim 1 stands rejected under 35 U.S.C. §103 as being unpatentable U.S. Patent 6,075,817 to Gruenberg in view of U.S. Patent 6,362,702 to Nielsen, and further in view of U.S. Patent 5,909,153 to Delano et al. This rejection is respectfully traversed.

Gruenberg relates to a compression method for transmitting digital information and was cited simply to show some sort of transmitter circuit. But that transmitter circuit has no relevance to the transmitter recited in claim 1. Indeed, Gruenberg's Figure 9a, entitled "Superresonant Transmitter Channel Circuit," by the Examiner's own admission, lacks every other feature recited in the body of claim 1. The Examiner then attempts to reconstruct the claims piece-by-piece using the Nielsen and Delano references.

Nielson is cited merely to show a self-oscillating modulator. That modulator is used in the context of a power conversion system. In other words, Nielsen relates to DC-AC, DC-DC, or AC-AC conversion systems and not to a telecommunication signal transmitter. Other than a self-oscillating modulator, Nielsen lacks all of the other features recited in claim 1.

In attempt to find these remaining features, the Examiner turns to Delano. Delano relates to compensating for delays in a modulator loop. Specifically, Delano introduces a feedback filter 308 in the modulator loop shown in Figure 3 which compensates for delays introduced by the power switching stage 304 or the output filter 306. There is no indication in Delano that filter

306 is a low pass demodulation filter. Nor is there any teaching in Delano (or the other two applied references) that

> the controlled self-oscillating modulator and the switching stage forms a controlled self-oscillation loop, where the controlled self-oscillating modulator receives the amplified, pulse width modulated signal output by the switching stage and provides the pulse width modulated output signal as a positive feedback to the input of the switching stage.

Similar deficiencies also exist with respect to independent claim 9. Independent claim 9 recites "superimposing the telecommunications signal on a carrier signal into a pulse width modulated signal," "amplifying the pulse width modulated signal," "inputting the amplified pulse width modulated signal to a controlled self-oscillating modulator," and "generating said carrier signal in said controlled self-oscillating modulator."

Delano does not disclose any transmitter, only a modulator. Thus, Delano fails to teach a self-oscillation loop "connected in series to the input of the transmitter and the demodulation filter," as recited in claim 1. The claimed transmitter input is connected to a switch stage input, while in Delano it is the *modulator* stage that has an input for an external signal. Nor does Delano describe "superimposing the telecommunications signal on a carrier signal into a pulse width modulated signal," as recited in claim 9. Delano also lacks the feature of feeding back a demodulated signal and superimposing it on an input to a switching stage. Rather, Delano's modulator output is fed back and combined with a sum of the switching stage output and the filtered signal from the modulator stage output. There is no teaching of superimposing this combined signal on the modulator input signal.

None of the applied references disclose this combination of steps in the context of transmitting a telecommunications signal. Lacking all of the features recited in the independent

claims, the rejections based upon Gruenberg, Nielsen and Delano or Gruenberg and Delano are improper and should be withdrawn.

Applicant also respectfully submits that the obviousness rejections are improper because they rely on hindsight. Because it is so easy to fall into the trap of using hindsight to conclude that an invention would have been obvious under 35 U.S.C. §103(a), courts have long applied a rigorous set of criteria, the Graham factors, to such contentions:

> Specifically, the obviousness analysis is based on four underlying factual inquiries, the well-known Graham factors: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of nonobviousness. Graham v. John Deere Co., 383 U.S. 1, 17-18, 86 S.Ct 684 (1966).

McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 1349 (Fed. Cir. 2001). The pertinent art for Graham analysis is defined by the "particular problem with which the inventor was involved." In re GPAC Inc., 57 F.3d 1573, 1578 (Fed. Cir. 1995).

In any obviousness analysis, it must be shown that there was a "motivation" or "suggestion" in the prior art to make the combination or modification. In re Rouffet, 149 F.3d 1350, 1357-1358 (Fed. Cir. 1998); see also In re Kotzab, 217 F.3d 1365, 1369 (Fed. Cir. 2000) ("Close adherence to this methodology is especially important in cases where the very ease with which the invention can be understood may prompt one 'to fall victim to the insidious effect of a hindsight syndrome wherein that which only the invention taught is used against its teacher.'"). A proper motivation to combine requires an appreciation of the desirability of making the combination. It is not measured by the feasibility of making the combination. See Winner Int'l Royalty Corp. v. Wang, 202 F.3d 1340, 1349 (Fed. Cir. 2000); see also Ecolochem, Inc. v. S.

Cal. Edison Co., 227 F.3d 1361, 1372 (Fed. Cir. 2000) ("question is whether there is something in the prior art as a whole to suggested the desirability...of making the combination.").

It is not surprising that the Examiner must rely upon hindsight since none of the three references applied recognize or even appreciate the problems to which the present application is directed. As explained in the background, the use of class D amplifiers such as pulse modulation amplifiers is very desirable in the context of digital subscriber link (DSL) type transmission applications. But even with advances in amplifier technology, there is a substantial power dissipation, which is much higher (e.g., around five or six times), than the required power transferred to the transmission line. In traditional class D amplification, an *external* carrier signal with constant frequency is used. Unfortunately, inter-modulation products will be produced in the switching stage that are located in the carrier frequency band. As a result, the external carrier signal frequency must be considerably higher than the highest frequency of the desired signal to be transmitted, which is typically on the order of 20 or 30 times higher. The use of high frequencies in the switching stage introduces noise to the output signal, with the noise level increasing with frequency. Moreover, the higher the frequency of the carrier signal, the greater the power loss.

Because of these problems with the use of external carrier frequencies in telecommunication applications, the inventor recognized that by using an amplifier, e.g., a class D amplifier, in which the carrier signal is *internally* generated, much more desirable frequency properties are obtained which increase efficiency and reduce power dissipation. Indeed, as shown in Figure 5a, in order to avoid inter-modulation products in the desired frequency band 51, the switching frequency of the amplifier need only be on the order of five times of the highest frequency of the desired frequency band 51 shown as F_1. When a conventional pulse

modulator amplifier using an externally generated carrier is employed, the carrier must have a frequency F_3 on the order 20 to 30 times the highest frequency F_1 of the desired frequency band 51. Thus, using a self-oscillating modulator to internally generate the carrier which is combined with the input signal provided to the switching stage provides considerable advantages.

None of the prior art applied by the Examiner even recognizes these problems. Gruenberg is concerned with compression of digital information. Nielsen is concerned with power conversion. Delano is concerned with delay compensation. The Federal Circuit has said on several occasions that the nature of the problem to be solved must be considered in any obviousness inquiry and that it is an important factor to determine whether or not there is any motivation to combine references. See, for example, *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998). Here, this recognition of the problem addressed by this application is completely absent. Moreover, problems addressed by each of three references applied by the Examiner are all quite different. A person of ordinary skill in the art would not be motivated any fashion to combine the teachings of these three references absent the teachings of the present application. Nor is the Examiner's posited motivation of combining Delano with Gruenberg and Nielsen to compensate for modulator loop delay a proper motivation because neither Nielsen nor Gruenberg is concerned with modulator loop delay. Moreover, Delano states at col. 3, lines 13-16 that the modulator may be of "any type" while the independent claims specify a controlled self-oscillating modulator. The switching stage in Delano may be inverting or non-inverting. See col. 3, lines 27-29. These two ambiguities also make it impractical to combine Delano with Gruenberg and Nielsen.

For the reasons set forth above, Applicant submits that the present application is in condition for allowance. An early notice to that effect is earnestly solicited.

Respectfully submitted,

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